MAKHOVER, M.

"At the shores of Africa." Nauka i zhizn' 28 no.1:73 Ja '61. (MIRA 14:1)

(Oceanographic research)

MAKHOVER, Minna Vladimirovna

Of the question (sul'fonamidnykh) preparations in unicellular organisms. Dissertation for candidate of a Medical Science Degree. Chair of General Biology (head prof. A.M. Lunts) Saratov Medical Institute, 1944

MAKHOVER, M.V.

Intravital changes in nerve cells of the entire body under the influence of novocaine. TSitologiia 1 no.2:195-201 Mr-Ap '59. (MIRA 12:9)

1. Kafedra obshchey biologii Leningradskogo sanitarno-gigiyenicheskogo meditsinskogo instituta.
(NERVES) (NOVOCAINE) (STAINS AND STAINING (MICROSCOPY))

MAKHOVER, M.V.

Cytochemistry of oogenesis in the house fly. Trudy LSGMI 43:69-75 '59. (MIRA 13:5)

(FLIES) (OOGENESIS)

MAKHOVER, M.V.

Cytochemical and cytological study of the hepatic cells in human embryo. Arkh. anat., gist. i embr. 49 no.8:38-44 Ag '65. (MIRA 18:9)

1. Kafedra obshchey biologii (nauchnyy rukovoditel'- chlen-korrespondent AMN SSSR prof. P.V. Makarov) Leningradskogo sanitarno-gigiyenicheskogo meditsinskogo instituta.

MAKHOVER S.L.

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

Ca

7

Determination of small quantities of chromium in the air of industrial plants. G. A. Gorodetskii and S. I. Makhover. *Hig. Truda* 15, No. 1, 84-5(1937); *Chimie & Industrie* 38, 889.—The Cr compds. are absorbed by passing the air through 0.3 *N* alkali. To 10 cc. of the soln. add 2 cc. of 0.04 *N* Br soln., heat 10 min. on the water bath, cool, add 3 cc. of aq. 0.2% PhOH soln., neutralize with 0.5 *N* H_2SO_4, add 2 cc. concd. AcOH and 1 cc. of a soln. of 1 g. diphenylcarbazide in 5 cc. AcOH and 495 cc. rectified alc., shake, make to 25 cc. with H_2O and compare with a standard prepd. by similarly treating 1-5 cc. of a $K_2Cr_2O_7$ soln. contg. 0.005 mg. Cr per cc.

A. Papineau-Couture

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

USSR

920. Polarographic determination of manganese in air. I. D. Kogan and S. L. Makhover (Gigiena i Sanit., 1954 (7), 52-53; Referat. Zhur. Khim., 1954, Abstr. No. 20,321).—Manganese (2 to 6 μg) is absorbed by hygroscopic wool in a glass tube; the wool is incinerated at 600° C in a muffle furnace and the residue is dissolved in 1 ml of conc. HCl. The acid is removed by evaporation on a water bath and the residue is dissolved in a little water. The soln. is transferred to a polarographic cell, a drop of 0·16 per cent. gelatin soln. and 2 ml of 0·5 N KCNS soln. are added, and the soln. is polarographed at a sensitivity of 1/25. The Mn half-wave potential is −1·55 V (vs. the S.C.E.). E. HAYES

MAKHOVER, Ye.S.

Protection of underground gas pipelines from external corrosion. Gaz.prom.no.3:20-25 Mr '56. (MIRA 10:1)

(Gas pipes) (Electrolytic corrosion)

MAKHOVER, YE. S.

MAKHOVER, Ye.S.; DUBROVSKAYA, E.V.

Measuring potentials in underground gas pipelines. Gas.prom.
no.8:14-18 Ag '56. (MLRA 10:7)
(Electrodes) (Electrolytic corrosion, as pipes)

SLADKOV, S.P., inzhener; MAKHOVER, Ye.S., inzhener.

Automatic draft signal for gas flues of water heaters activated by rarification. Gor. khoz. Mosk. 30 no.7: 13-15 Jl '56. (MLRA 9:10)

1. Institut "Mospodzemproyekt."

(Gas appliances)

MURAV'YEV, I.N.; MAKHOVER, Ye.S.; ALEKSANDROVICH, A.I.

Sanitary engineering pipes made of plastic materials. Gor. khoz. Mosk. 32 no.7:5-8 Jl '58. (MIRA 11:6)

1. Direktor instituta "Mospodzemproyekt" (for Murav'yev). 2. Rukovoditel' masterskoy No.9 instituta "Mospodzemproyekt" (for Makhover). 3. Glavnyy inzhener masterskoy No.9 instituta "Mospodzemproyekt" (for Aleksandrovich).

(Pipe, Plastic)

ALEKSANDROVICH, A.I.; MAKHOVER, Ye.S.; SLADKOV, S.P.; TROITSKAYA, F.B.

"Ogonek," an automatic, gas-operated air heater. Gaz.prom. 5 no.1:25-30 Ja '60. (MIRA 13:4)
(Gas--Heating and cooking)

MAKHOVER, ~~Ye.S.;~~ ALEKSNADROVICH, A.I.

Over-all automation of heating-system boiler rooms of all types.
Gor. khoz. Mosk. 35 no.2:28-31 F '61. (MIRA 14:2)

1. Rukovoditel' masterskoy No.9 Instituta "Mosinzhproyekt" (for Makhover). 2. Glavnyy inzhener masterskoy No.9 Instituta "Mosinzh-proyekt" (for Aleksandrovich).
(Automatic control) (Hot-water heating)

ALEKSANDROVICH, A.I.; MAKHOVER, Ye.S.

Plastic underground gas pipelines. Gaz. prom. 9 no.5:16-22 '64.
(MIRA 17:6)

[illegible] Certain problems of the theory of plasticity of anisotropic media. Doklady Akad. Nauk SSSR (N.S.) 58, 210–212 (1947). (Russian)

The author applies R. von Mises' equations for the plastic deformation of crystals [Z. Angew. Math. Mech. 8, 161–[illegible] (1928)] to the problems of torsion and plane strain. In the case of torsion, for instance, it is assumed that the crystal is twisted about a principal axis, that the torque is large enough to produce plastic flow throughout the crystal and that the velocity of the points in a generic cross section is obtained from a rotation of this cross section in its plane and a simultaneous warping which is the same for all cross sections. It is shown that this particular kinematic scheme is possible only in regular, hexagonal and monoclinic crystals. Plane strain is discussed along similar lines. Here, too, it is found that the basic equations are satisfied only in the regular, hexagonal and monoclinic systems.

W. Prager (Providence, R. I.).

Source: Mathematical Reviews, 1948, Vol 9, No. 5

MAKHOVER, Ye. V.

SA

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FF

PROCESSES AND PROPERTIES INDEX

539.374 : 539.22 : 548

[illegible]. Some problems in the theory of plasticity of anisotropic media. Makhover, E. V. Dokl. Akad. Nauk SSSR, [illegible] (No. 2) [illegible] ([illegible]) In Russian.— An examination of plastic torsional and two-dimensional deformation to determine the necessary and sufficient conditions for the constants of the medium to obtain a given deformation with any contour of the cross-section, the condition of flow being based on Mises' hypothesis. It is found that plastic torsional deformation is only possible if the plastic constants of the medium satisfy the condition $a = b = c = d = 0$, which in the particular case corresponds to a crystal with regular anisotropy. Expressions are also given for hexagonal and monoclinically-anisotropic crystals. Applying the transformation suggested by M. Levy to the two-dimensional case a system with limited coefficients is obtained which is integrable in the same manner as the equations of an isotropic medium. The conditions for the fulfilment of the Levy transformation are stated. L. J. G.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

MAKHOVER, Ye. V.

124-11-13062

Translation from: Referativnyy Zhurnal, Mekhanika, 1957, Nr 11, p 112 (USSR)

AUTHOR: Makhover, Ye. V.

TITLE: Bending of a Plate Having Variable Thickness and a Sharp Edge. (Izgib plastinki peremennoy tolshchiny s ostrym krayem)

PERIODICAL: Uch. zap. Leningr. gos. ped. in-ta, 1957, Vol 17, pp 28-39

ABSTRACT: Investigation of the equation of the bending of a plate with variable thickness and a sharp edge for specified boundary conditions. The quartic differential equation obtained appears to degenerate on part of the contour, and in its study the Author took his point of departure from the theory of degenerate second-order elliptical equations as developed in the works of S. G. Mikhlin and others. He clarifies the conditions of discreteness of the operators in the equation.

(P. M. Varvak)

Card 1/1

MAKHOV, Ye. V., inzh.

Change in the light distribution of a point source of light when submerged in water. Svetotekhnika 9 no.2:19-21 F '63. (MIRA 16:4)

(Swimming pools--Lighting)

MAKHOVA, Yu.V.; TROSHKINA, Ye.S.

Results of the study of the layering and banding of Elbrus glaciers, based on spore-pollen analysis data. Inform.sbor. o rab.Geog.fak.Mosk.gos.un.po Mezhdunar.geofiz.godu no.9:126-138 '62. (MIRA 16:2)

(Elbrus, Mount—Glaciers) (Elbrus, Mount—Palynology)

ALEKSANDROVICH, A.I., inzh.; MAKHOVER, Ye.S., inzh.; KHAYKIN, M.M., inzh.

The "Progress" flush tank. Gor.khoz.Mosk. 36 no.7:21-22 Jl '62. (MIRA 16:1)

(Water closets)

MAKHOVER, Ye.V.

Spectrum of the fundamental frequencies of a plate with a sharp edge. Uch zap. Ped inst Gerts. 197:113-118 '58. (MIRA 16:9)
(Differential equations)
(Frequencies of oscillating systems)

GOTLIB, V.Ya., inzh.; MAKHOVER, Yu.M., inzh.

Experimental study of the performance of a loading bucket conveyor. Trudy LIVT no.68:58-64 '64. (MIRA 18:11)

BORODATOV, V.A., kand.biolog.nauk; DEMIDOV, V.F.; DUKHANIN, A.N.; ZHUKOVA, A.I.; KADIL'NIKOV, Yu.V.; KARPECHENKO, Yu.L.; KORZHOVA, Yu.A.; MAKHOVER, Z.I.; PETROV, G.P.; PROSVIROV, Ye.S.; RULEV, N.N.; SOKOLOV, O.A.; SPICHAK, M.K.; KHROMOV, N.S.; SHUIN, V.I., red.; FORMALINA, Ye.A., tekhn.red.

[Study of tuna fish and sardines in the eastern part of the Atlantic Ocean; report on the cruise of the scientific fishery survey expedition of 1957] Issledovaniia tuntsa i sardiny v vostochnoi chasti Atlanticheskogo okeana; reisovyi otchet nauchno-poiskovoi ekspeditsii, 1957 g. Moskva, 1959. 158 p. (MIRA 13:6)

1. Moscow. Vsesoyuznyy nauchno-issledovatel'skiy institut morskogo rybnogo khozyaystva i okeanografii.
(Atlantic Ocean--Tuna fish) (Atlantic Ocean--Sardines)
(Fish, Canned)

MAKHOVER, Z.M.

Tornado in the vicinity of Voronezh. Priroda 43 no.5:113-114 My '54.
(MLRA 7:5)

1. Voronezhskoye Gidrometbyuro. (Voronezh--Tornadoes)
(Tornadoes--Voronezh)

MAKHOVER, Z. M.

USSR/Physics of the Atmosphere - Dynamic Meteorology, M-2

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 36082

Author: Antonov, V. S., Baranov, N. P., Makhover, Z. M.

Institution: None

Title: Certain Results of Applying the Suggestions by K. I. Kashin and M. V. Gritsenko to the Prediction of the Emergence of Caspian Cyclones

Original Periodical: Meteorol. i gidrologiya, 1955, No 6, 34-35

Abstract: For the sake of verification, an analysis was made of 32 aerologically-interpreted cyclones in the regions of the northern Caucasus, the Caspian, and the Povolzh'ye. In 30 cases the cyclones moved parallel to the axis of the tongue of heat on the 500 mb isobaric surface thus, confirming the correctness of the above statement. An example illustrating the motion of the cyclone in accordance with the above assumption is given.

Card 1/1

ANTONOV, V.S.; MAKHOVER, Z.M.

What do isotherm charts reflect at the 500 millibar level? Meteor.i gidrol. no.9:32 S '56. (MLRA 9:11)

(Atmospheric temperatue)

ANTONOV, V.S.; BARANOV, N.P.; MAKHOVER, Z.M.

Forecasting the appearance of Caspian cyclones in the southeastern European region of the U.S.S.R. Trudy TSIP no.42:3-10 '56. (MLRA 9:11)

1. Voronezhskoye gidrometbyuro.
(Russia, Southern--Cyclones)

MAKHOVER, Z.M.; KALYUZHNYY, A.S.

Thunderstorms in winter. Priroda 45 no.2:126 F '56. (MLRA 9:5)

1. Nachal'nik Voronezhskogo Gidrometbyuro (for Makhover); 2. Starshiy inzhener-sinoptik Rostovskogo-na-Donu byuro pogody. (for Kalyuzhnyy).

(Thunderstorms)

MAKHOVER, Z. M.

AUTHOR: Makhover, Z. M.

TITLE: Servising the National Economy Organizations by the Voronezh Hydrometeorological Bureau(Obsluzhivaniye narodnokhozyays tvennykh organizatsiy gidrometeorologicheskim byuro Voronezh)

PERIODICAL: Meteorologiya i Gidrologiya, 1957, No. 1, pp. 42-43 (U.S.S.R.)

ABSTRACT: The daily activities of the Voronezh Hydrometeorological Bureau in its functions of servicing the city of Voronezh and the Voronezh region are described. Weather forecasts are transmitted over radio, telephone and bulletins twice daily at 0700 and 1400 hours. In contrast to other such bureaus, the Voronezh Office also publishes early morning hydrological bulletins for regional agricultural and other organizations interested in weather forecasts. The radio operators of the Office have learned how to prepare weather cards (prepared at 0300 and 1500 hours) on the basis of data received by radio. The daily weather bulletin carries weather forecasts for 24-hour periods from 10 o'clock of one day to 10 o'clock of the following day, weather forecasts for the following 2 days, weather reviews for the days past and meteorological data. Every day, at 1400 hours, the Bureau compiles weather prognoses from 1900 hours of the current day to 1900 hours of the day following. These forecasts are telephoned to service organizations for futher dissemination. The Office employs the

Card 1/2

Servicing the National Economy Organizations by the Voronezh Hydrometeorological Bureau

newest methods in preparing isothermal charts which are used in preparing weather forecasts. Senior engineer-synoptician V. S. Antonov introduced a special system for the calculation of vertical currents by the wind field. Precipitations are computed by the A. A. Bachurina method. The Office has a detailed climatic description of the territory serviced. Agriculture is furnished data regarding early fall radiation frosts and weather phenomena dangerous to agriculture. Regularly twice yearly during fall and spring the office conducts synoptic investigations of processes and phenomena for winter and summer. Spring weather forecasts also include data about soil temperature at a depth of 10 cm. The importance of these services to farming and industry is analyzed.

ASSOCIATION:

PRESENTED BY:

SUBMITTED:

AVAILABLE:

Card 2/2

MAKHOVER, Zalman Moiseyevich; PERVAKOV, I.L., red.; ZORKINA, G.P., mladshiy red.; VILENSKAYA, E.N., tekhn.red.

[On African shores] U beregov Afriki. Moskva, Gos.izd-vo geogr.lit-ry, 1960. 89 p. (MIRA 13:9)
(Africa--Description and travel)

MAKHOVER, Z.M.

Distribution of summer precipitation over small areas. Sbor. rab.Kursk.gidromet.obser. no.1:66-73 '60. (MIRA 14:8)
(Precipitation (Meteorology))

AUTHOR: Makhover, Z. M. S/050/60/000/03/005/020
B007/B002

TITLE: Comparison of the Mean Tropospheric Temperature With the Temperature at ~~the 500 mb Level~~

PERIODICAL: Meteorologiya i gidrologiya, 1960, Nr 3, pp 29 - 30 (USSR)

ABSTRACT: On the basis of analyses of 1034 probings of the atmosphere made in Kursk and Tambov, the author showed in the paper of reference 1 that the isothermal lines at the 500 mb level yielded the mean tropospheric temperature. In the present paper, the mean values of tropospheric temperatures are compared with the temperatures at the 500 mb level on 27 stations in the northern and central region of the European part of the USSR. For this purpose, the corresponding temperatures and their altitudes were computed, as well as the difference between the mean tropospheric temperature and that of the 500 mb level. The mean tropospheric temperature (t_{Tr}) was determined as the arithmetic mean from the values of the air temperature at the earth's surface or at the upper level of the ground inversion, and from the temperature at the tropopause level. The hight (h_{tTr}) at which the mean tropospheric temperature had been found, was also determined by extrapolation of the temperature of different levels. The determination of the temperature of the

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500 mb level (t_{500}) and the height of this level (h_{500}) did not involve any difficulties. On the basis of the data obtained, the diagrams for the t_{Tr} and t_{500} courses shown in figure 1, and also the diagrams for the changes in h_{tTr} and h_{500} were constructed. By means of these diagrams it is shown that the maps of isothermal lines for the 500 mb level reproduce the distribution of the mean tropospheric temperature. It is noted that the winter temperature gradients are slightly larger on the maps of the temperature of the 500 mb level than the gradients on the maps of the mean tropospheric temperature. There are 1 figure and 3 Soviet references.

MAKHOVER, Z.M.

Microsynoptic distribution of summer precipitation in Nizhnedevitsk District, Voronezh Province. Sbor. rab. po sinop. no.5:67-86 '60. (MIRA 14:8)

1. Gidrometeobyuro Voronezh.
(Nizhnedevitsk District--Rain and rainfall)

MAKHOVER, Z.M.; SMIRNOVA, M.I.

Winter floods in the upper course of the Don River. Trudy TSIP no.100:92-101 '60. (MIRA 14:5)
(Don River—Floods)

MAKHOVER, Z.M.

A.I.Voeikov at the 9th Congress of Naturalists and Physicians. Izv. Vses. geog. ob-va 93 no.6:541-543 N-D '61. (MIRA 15:1)
(Voeikov, Aleksandr Ivanovich, 1842-1916)

MAKHOVER, Z.M. (Voronezh)

Hurricane in Voronezh. Priroda 51 no.3:69-71 Mr '62.
(MIRA 15:3)

(Voronezh Province--Hurricanes)

MAKHOVER, Z.M.

Microclimatic characteristics of the number of days with the precipitations and duration of their fall. Sbor. rab. Kursk. gidromet. observ. no.2:42-49 '64. (MIRA [illegible])

GORDEYEV, G.S., prof.; YAKUSHKIN, D.I.. Prinimali uchastiye: GORSKAYA, N.V.; GRANOVSKAYA, A.Ye.; YEVSTIGNEYEVA, Yu.G.; KRYLOV, M.V.; LEYKIN, D.I.; MAKHOVETSKIY, V.B.; MEYENDORF, A.L.; NAZARENKO, V.I.; NICHIPORUK, O.K.; PAVLOV, L.I.; RUMYANTSEVA, N.V.; SOSENSKIY, I.I.; CHERNEVSKIY, Yu.V.. TULUPNIKOV, A.I., red.; SOLOV'YEV, A.V., prof., red.; RAKITINA, Ye.D., red.; ZUBRILINA, Z.P., tekhn.red.

[Agriculture in capitalist countries; a statistical manual] Sel'skoe khoziaistvo kapitalisticheskikh stran; statisitcheskii sbornik. Moskva, Gos.izd-vo se' khoz.lit-ry, 1958. 247 p. (MIRA 12:5)

1. Moscow. Vsesoyuznyy nauchno-issledovatel'skiy institut ekonomiki sel'skogo khozyayastva. 2. Otdel nauchnoy informatsii po ekonomike i organizatsii sel'skogo khozyayastva zarubezhnykh stran Vsesoyuznogo nauchno-issledovatel'skogo instituta ekonomiki sel'skogo khozyaystva (for all except Tulupnikov, Solov'yev, Rakitina, Zubrilina). 3. Direktor Vsesoyuznogo nauchno-issledovatel'skogo instituta ekonomiki sel'skogo khozyaystva (for Tulupnikov). 4. Zamestitel' direktora Vsesoyuznogo nauchno-issledovatel'skogo instituta ekonomiki sel'skogo khozyaystva (for Solov'yev).

(Agriculture--Statistics)

MAKHNOVICH, Anatoliy Timofeyevich; TABUNINA, M.A., red.

[Safety manual for workers employed at building-site mortar-making plants] Pamiatka po tekhnike bezopasnosti dlia rabochikh, obsluzhivaiushchikh rastvornye uzly na stroitel'noi ploshchadke. Moskva, Stroiizdat, 1964. 26 p. (MIRA 18:8)

MAKHOVICH, S.D.; BALABAN, N.I.

Result of centralized bookkeeping. Zdravookhranenie 5 no.5: 47-48 S-O'62. (MIRA 16:7)

1. Iz Leovskoy rayonnoy bol'nitsy (glavnyy vrach - S.D. Makhovich), Moldavskaya SSR.
(LEOVO—DISTRICT—HOSPITALS—ACCOUNTING)

MAKHOVICHEVA

CZECHOSLOVAKIA/Analytical Chemistry - Analysis of Organic Substances E-3

Abs Jour : Ref Zhur - Khimiya, No 3, 1958, No 7723

Author : Makhovicheva
Inst : Not Given
Title : The Separation of Reserpine, Reserpinic Acid and Yohimbine by Paper Chromatography.

Orig Pub : Ceskosl. farmac., 1957, 6, No 6, 310-311

Abstract : For the separation of reserpine (I) from reserpinic acid (II) and yohimbine (III) the solvent systems of the Zaffaroni type are suitable (Zaffaroni A. J. Biol. Chem., 1951, 188, 763)

II and III remain on the spot where a drop is introduced and I has a sufficiently great R value. The method is suitable for the identification of I in tablets. For the separation of II from III basic and n-butanol containing systems are suitable. In this case I is displaced together with the solvent front. By combining both chromatographic methods I, II, and III are separated. The alkaloid spots are observed under ultra-violet light.

Card : 1/1

ACCESSION NR: AP4028467 S/0181/64/006/004/1249/1251

AUTHORS: Trubitsy*n, A. M.; Kabanov, A. A.; Boldy*rev, V. V.; Makhovik, A. K.

TITLE: The nature of electrical conductivity in the permanganates of alkali metals

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1249-1251

TOPIC TAGS: electric conductivity, alkali permanganate, thermoelectromotive force, transference number

ABSTRACT: The type of conductivity in ionic crystals of permanganate type was established by investigating the electrical conductivity, the transference numbers, and the thermoelectromotive force. The samples were prepared from chemically pure materials pressed at room temperature under a pressure of 10^4 kg/cm^2 for 4 minutes. It was found that the electrical conductivity is practically the same at high temperatures for $KMnO_4$, $RbMnO_4$, and $CsMnO_4$, but that the activation energies are different for each. The MnO_4^- is much larger than the cations, and this, with the experimental data, indicates that the electrical conductivity of the indicated compounds is nonionic and that the cations are not responsible for the electrical conductivity. In all these permanganates the thermoelectromotive force proved to be

ACCESSION NR: AP4028467

negative, indicating an electron mechanism of electrical conductivity. Orig. art. has: 1 figure.

ASSOCIATION: Tomskiy institut radioelektroniki i elektronnoy tekhniki (Tomsk Institute of Radio Electronics and Electronic Engineering)

SUBMITTED: 06Dec63 DATE ACQ: 27Apr64 ENCL: 00

SUB CODE: IC, EM NO REF SOV: 004 OTHER: 005

Card 2/2

GORN, Vasiliy Nikolayevich; MAKHOVIKOV, Dmitriy Ivanovich; ZAV'YALOV, G.N., redaktor; VERINA, G.P., tekhnicheskiy redaktor.

[Semiautomatic brake release accelerator] Poluavtomaticheskii uskoritel' otpuska tormozov. Moskva, Gos.transportnoe zhel.dor. izd-vo, 1954. 22 p. (MLRA 8:9)
(Brakes)

MAKHOVIKOV, V.I.

Solution of the heat conduction problem for a plate. Dokl. AN BSSR 7 no.9:602-605 S '63. (MIRA 17:1)

1. Predstavleno akademikom AN BSSR A.V. Lykovym.

MAKHOVIKOV, V.I. [Makhovykov, V.I.] (Khar'kov)

Shift of a cylinder having a multiply connected lateral cross section. Prykh.mekh. 9 no.5:544-551 '63. (MIRA 16:10)

1. Khar'kovskoye vyssheye voyennoye aviatsionnoye uchilishche letchikov.

MAKHOVIKOV, V.I. (Kharkiv)

Approximate conformal mappings and their application in the theory of elasticity [with summary in English]. Prykl. mekh. 3 no.1:20-37 '57. (MLRA 10:5)

1. Kharkivs'kiy avtomobil'no-shlyakhoviy institut.
(Conformal mapping) (Elasticity)

MAKHOVIKOV, V.I.

21-5-2/26

AUTHOR: Makhovikov, V.I. (Makhovykov, V.I.)

TITLE: Two Compound Problems for Analytical Functions (Dve smeshanyye zadachi dlya analiticheskikh funktsiy)

PERIODICAL: Dopovidi Akademii Nauk Ukrains'koi RSR, 1957, Nr 5, p 431-435 (USSR)

ABSTRACT: The author proposes a method for solving boundary problems in two cases. The first case deals with a unit circle containing the points $e^{i\theta_\nu}$ and $e^{i\theta'_\nu}$ and the arcs ℓ_ν, ℓ'_ν ($\nu = 1,2,\ldots m$). The problem consists of finding an analytical function $\varphi(\zeta)$ in the circle, if the boundary conditions are as follows (formulas 1 in the article):

$$\left.\begin{aligned} &\varphi(\varepsilon)+\overline{\varphi(\varepsilon)}=P_0(\theta)+\overline{P_0(\theta)} \text{ in the arcs } (\nu = 1,2,\ldots m;\ \varepsilon = e^{i\theta}) \\ &h(\theta)\varphi(\varepsilon)+\overline{h(\theta)}\,\overline{\varphi(\varepsilon)}=h(\theta)P_1(\theta)+\overline{h(\theta)}\,\overline{P_1(\theta)} \text{ in the arcs } \ell'_\nu \end{aligned}\right\} (1)$$

where $P_0(\theta)$, $P_1(\theta)$, $h(\theta)$ are fragment-continuous and periodic functions of θ. The bar over the function means a

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conjugated function. The methods consists in the construction of the function

$$f(\theta)=e^{\omega_1(\varepsilon)+\overline{\omega_2(\varepsilon)}} = \begin{cases} 1 & \text{in the arcs } l_\nu \\ \Omega(\theta) & \text{in the arcs } l'_\nu \end{cases} \qquad (2)$$

where $\omega_1(\varepsilon)$ and $\omega_2(\varepsilon)$ are values of "analytical-in-the-circle" functions $\omega_1(\zeta)$ and $\omega_2(\zeta)$ in the unit circle. The systems of equations (1) is then reduced to one equation and this equation is solved with respect to the unknown function $\varphi(\zeta)$. In the second problem there is a region D which is mapped conformally on the circle. The problem consists in the finding "analytical-in-the-unit-circle" functions $\psi(\zeta)$ and $\varphi(\zeta)$, if the boundary conditions are as follows:

$$\left.\begin{aligned} &\psi(\varepsilon)+\frac{\overline{\omega(\varepsilon)}}{\omega'(\varepsilon)}\varphi(\varepsilon)+\overline{\varphi(\varepsilon)}=P_0(\theta) && \text{in the arcs } l_\nu \\ &\psi(\varepsilon)+\frac{\overline{\omega(\varepsilon)}}{\omega'(\varepsilon)}\varphi'(\varepsilon)+\Omega(\theta)\overline{\varphi(\varepsilon)}=P_1(\theta) && \text{in the arcs } l'_\nu \end{aligned}\right\}(\nu=1,2,\dots.m) \qquad (12)$$

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where $P_0(\theta)$, $P_1(\theta)$, $\Omega(\theta)$ are given functions. By making use

MAKHOVIKOV, V. I., Candidate of Tech Sci (diss) -- "Approximate conformal representations and their application to the theory of elasticity". Khar'kov, 1959. 9 pp (Acad Sci Ukr SSR, Inst of Structural Mech), 150 copies (KL, No 20, 1959, 113)

20

67511

SOV/155-59-1-16/30

~~16(1)~~ 16,7300

AUTHOR: Makhovikov, V.I.

TITLE: On the Solution of the Problem of Elasticity for a Cylinder

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1959, Nr 1, pp 102-109 (USSR)

ABSTRACT: Given a right cylinder the cross section of which is a certain domain D the boundary of which may be an arbitrary plane curve. The diameter of the domain D is sufficiently smaller than the height of the cylinder. The author proposes a solution of the equations of equilibrium in shifts (equations of Lamé) which permits to satisfy completely the boundary conditions at the lateral face of the cylinder for certain loads. The boundary conditions at the bases are not satisfied; but the author points out that by averaged consideration of the boundary conditions (compare [Ref 1]) at the bases it always can be reached that in agreement with the principle of Saint-Venant the obtained state of tension distinguishes from the real one only in the neighborhood of the bases. Papkovich and Galerkin are mentioned.

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On the Solution of the Problem of Elasticity for a Cylinder SOV/155-59-1-16/30

There are 2 Soviet references.

ASSOCIATION: Khar'kovskiy avtomobil'no-dorozhnyy institut (Khar'kov Automobile Road Institute)

SUBMITTED: December 7, 1958

Card 2/2

MAKHOVIKOV, V.I.

Solving the elasticity problem for a plate. Nauch.dokl.vys. shkoly; stroi. no.2:63-70 '59. (MIRA 13:4)

1. Rekomendovana kafedroy stroitel'noy mekhaniki Khar'kovskogo avtodorozhnogo instituta.
(Elastic plates and shells)

16(1) SOV/21-59-2-4/26

AUTHOR: [illegible]ovikov, V.I.

TITLE: The Mixed Problem and Conformal Mapping (Smeshannaya zadacha i konformnoye preobrazovaniye)

PERIODICAL: Dopovidi Akademii nauk Ukrains'koi RSR, 1959, Nr 2, pp 125-129 (USSR)

ABSTRACT: Using the data contained in reference 3, the author proves, that by using the results of a mixed problem examined in that reference, it is possible to approximately construct conformal mapping functions. This article contains an examination of one mixed problem for analytical functions (peripheral problem) and a way of representing the inside of a square area with rounded-up corners. Designations are standard mathematical. The agreed-upon designations are as follows: "e" (with powers) are points on respective circle, "l" with indices and powers, are arcs, $|\zeta|<1$ is a circle, Re F is real part of function, $u(\zeta)$ and $v(\zeta)$ are values on a circle ζ; a, $\varphi(\cdot)$ are

Card 1/2

functions, Po is function of parameter, x and y are end points of an [illegible] also and [illegible], [illegible] of a circle. There are 2 diagrams and 3 Soviet references.

ASSOCIATION: Khar'kovskiy avtomobil'no-dorozhnyy institut (Khar - kov Automobile and Road Institute)

PRESENTED: By F... Belyankin Member [illegible] SSR

SUBMITTED: June 17, 1958

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24 (8)

68785
S/170/59/002/12/018/021
B014/B014

AUTHOR: Makhovikov, V. I.

TITLE: Determination of Thermal Stresses in a Cylinder

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1959, Vol 2, Nr 12, pp 97-104 (USSR)

ABSTRACT: The author studied a cylinder of arbitrary cross section, the height of which is great compared to its diameter. The heat equation was solved by fully satisfying of the boundary condition on the surface of the cylinder. This was achieved by the application of equation (1) by Duhammel-Neuman. Proceeding from equation (1) and the stress equations (2) the author investigated the displacement problem for which purpose he derived formulas (10). Equations (12) describe the surface of the cylinder. On the basis of the boundary conditions (14) the author deduced equation (19) for the case in which the surface tensions are given. Equation (26) offers a solution for the case in which the temperature along the cylinder varies linearly. There are 1 figure and 7 Soviet references.

ASSOCIATION: Avtomobil'no-dorozhnyy institut, g. Khar'kov (Highways Institute, City of Khar'kov)

Card 1/1

16(1) SOV/21-59-3-5/27

AUTHOR: Makhovikov, V.I.

TITLE: Some Problems for LaPlace's Equation (Neskol'ko zadach dlya uravneniya Laplasa)

PERIODICAL: Dopovidi Akademii nauk Ukrains'koi RSR, 1959, Nr 3, pp 245-251 (USSR)

ABSTRACT: The author presents his contribution to the use of La Place equation for the solution of problems in the field of mechanics. Three solutions of the equation are presented. One solution (15) makes it possible to fully satisfy the boundary conditions on a cylindrical surface and at several points at the ends of the cylinder. A simultaneous application of the function (13) and (15) solves the problem for a plate with given polyharmonics from x,y functions on the end faces, when the boundary conditions on the cylindrical surface are satisfied by several lines z = const. Another solution (22)

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Some Problems for La Place's Equation SOV/21-59-3-5/27

makes it possible to reduce the space boundary problem for a body obtained at rotation of plane region D around axis z, to plain boundary problems on the boundary of region D.

ASSOCIATION: Khar'kovskiy avto-dorozhnyy institut (Khar'kov Auto-Road Institute)

PRESENTED: June 17, 1958, by F.P. Belyankin, Member of the AS UkrSSR

Card 2/2

MAKHOVIKOV, V.I. [Makhovykov, V.I.] (Khar'kov)

Approximate methods of conformal mapping of double-connected areas. Prykl. mekh. 5 no.3:257-275 '59. (MIRA 13:2)

1. Khar'kovskiy avtomobil'no-dorozhnyy institut.
(Conformal mapping) (Elastic plates and shells)

MAKHOVIKOV, V.I.

Determination of thermal stresses in a cylinder. Inzh.-fiz. zhur. no.12:97-104 D '59. (MIRA 13:4)

1. Avtomobil'no-dorozhnyy institut, Khar'kov.
(Thermal stresses)

MAKHOVIKOV, V. I.

report presented at the 1st All-Union Congress of Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb '60.

168. [illegible] (Dnepropetrovsk): On space buckling of columns in the elastic-plastic range.

169. V. S. Lenskiy (Moscow): Vibro-creep at room temperature.

170. V. S. Lenskii (Moscow): Plasticity of metals under combined loading.

171. A. I. Leonov (Moscow): Some problems of non-stationary flow of an incompressible visco-elastic (Maxwellian) liquid.

172. A. I. Leonov, N. D. Rusinov (Moscow): Some problems of quasi-steady flow of an incompressible visco-elastic (Maxwellian) liquid.

173. M. Ia. Leonov (Lvov): The generalization of the torsion theory of thin-walled bars.

174. M. Ia. Leonov, V. V. Panasyuk (Lvov): The development of microcracks.

175. Yu. R. Lepik (Tartu): Plastic flow of circular plates under tension and bending of compression and bending.

176. S. G. Lekhnitskiy (Leningrad): Torsion of an anisotropic curved bar.

177. A. D. Lizarev (Sverdlovsk): Free vibrations and stability of ordinary and prestressed elastic restrained beams.

178. A Lisowski (Krakow): Displacement of rocks due to excavation of sloping layers.

179. B. V. Litvinov (Kiev): On the application of matrix transformations to the solution of large sets of linear equations of elasticity theory.

180. G. I. Lethia (Tomsk): The selection of optional parameters for structures of equal stability consisting of plates and stringers.

181. P. A. Lukash (Moscow): Large deflections of shallow shells of non-linear elastic materials.

182. Ia. B. Lhin (Voronezh): Methods for the solution of the problems of axisymmetric states of stress in shells of revolution.

183. B. A. Malakhovskiy (Ozel): Analysis of an orthotropic circular conical shell under an arbitrary load applied to a ring.

184. A. V. Malashenko (Kiev): On the experimental study of strains in plates and shells.

185. M. I. Malinin (Novosibirsk): Creep strains and ruptures of high polymers.

186. R. L. Malkina (Sverdlovsk): Vibrations of non circular cylindrical shells.

187. A. K. Malmeister (Riga): Some problems of combined loading of quasi-isotropic bodies.

188. K. A. Maltsov (Leningrad): The influence of structural discontinuity in concrete on its strength.

189. S. G. Mamedova (Baku): Investigation of the state of stress in a square prism with coaxial cylindrical hole under internal pressure.

190. G. F. Mandzhavidze (Tbilisi): Solving the plane elastic problem for anisotropic bodies by reduction to the problem of linear coupling with "displacements".

191. L. I. Manevich, Yu. A. Shevliakov (Dnepropetrovsk): The stability of a cylindrical shell in bending.

192. V. M. Marchenko (Moscow): Stress and strain in naturally twisted bars.

193. V. I. Makhovikov (Taganrog): The problems of conformal transformation and plane elasticity for the exterior of an infinite number of holes.

194. Ia. A. Macherat (Moscow): The design of finite and infinite beams on elastic foundation including time effects and without adopting the hypothesis of Zimmerman and Winkler.

195. A. S. Maliakovskiy (Stalino): Vibrations of a curved bar in an elastic medium and on elastic supports.

196. S. R. Meschian (Erevan): An experimental study of basic creep laws for soils.

197. O. S. Migirenko (Novosibirsk): On statically equivalent loadings.

198. M. Sh. Mikeladze (Tbilisi): Contribution to the theory of plastic shells of uniform strength.

199. R. S. Minasian (Erevan): On the bending of a simply supported parallelogram plate.

200. N. V. Mikhailov (Moscow): Evaluation of the rheological properties of elastic, visco-plastic materials in homogeneous strain-rate under constant shearing stress.

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S/170/60/003/010/016/023
B019/B054

26.2181

AUTHOR: Makhovikov, V. I.

TITLE: The Problem of Heat Conduction Concerning Bodies of Rotation

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 10, pp. 103-105

TEXT: The author proceeds from Laplace equation (1) in cylindrical coordinates, and by the substitution $\Phi = \sqrt{\varrho}T$ he obtains the differential equation $\nabla_1^2\Phi = \partial^2\Phi/\partial z^2 + \partial^2\Phi/\partial\varrho^2 + \frac{1}{\varrho^2}(\partial^2\Phi/\partial\theta^2 + \Phi/4) = 0$. This differential equation (2) has the solution (3), and by introducing the solution in the differential equation, the author obtains a very extensive expression. If the temperature distribution on the surface of the body of rotation is given by

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APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001031610002-7"

The Problem of Heat Conduction Concerning Bodies of Rotation

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B019/B054

$$T = \frac{1}{\sqrt{Q}} \sum_{k=0}^{n} \left[\cos\frac{\Theta}{2} f^{(2n-2k)}(\Theta) p_k + \sin\frac{\Theta}{2} f^{(2n-2k+1)}(\Theta) q_k \right] \quad (6),$$

the boundary conditions are fulfilled with the aid of the function $T = \frac{1}{\sqrt{Q}} \Phi$.

ASSOCIATION: Avtomobil'no-dorozhnyy institut, g. Khar'kov (Highway Institute, Khar'kov)

SUBMITTED: March 22, 1960

Card 2/2

15

85930

S/140/60/000/003/009/011
C111/C222

16.7300

AUTHORS: Makhovikov, V.I., and Ishchenko, I.M.

TITLE: The Determination of Tensions in a Space of an Orthotropic Medium With a Cylindric Cavity

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, 1960, Nr.3, pp.205-212

TEXT: The authors consider an elastic orthotropic body with a cylindric cavity, the generators of which are parallel to the z-axis, while the body is bounded by the planes z = h, z = -h. The directrix of the cylinder is an arbitrary curve L. At first the authors give the conditions of equilibrium in the shifts u, v, w, according to (Ref.1). Then the following arrangement is made for the shifts:

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The Determination of Tensions in a Space of an Orthotropic Medium With a Cylindric Cavity

(2)

$$
\begin{aligned}
u &= 2\,\mathrm{Re}\Big[f(z)(\varphi_2+\psi_2)+f'(z)\Big(\varphi_1+\psi_1+\beta_1\int\lambda_2 d\xi_3\Big)+\\
&\quad +f''(z)\Big(\varphi_0+\psi_0+\beta_1\int\lambda_1 d\xi_3+\alpha_2\bar{\xi}_1\int\varphi_2 d\xi_1+\alpha_2'\bar{\xi}_2\int\varphi_2 d\xi_2\Big)\Big],\\
v &= 2\,\mathrm{Re}\Big[f(z)(\alpha_0\varphi_2+\beta_0\psi_2)+f'(z)\Big(\alpha_0\varphi_1+\beta_0\psi_1+\beta_2\int\lambda_2 d\xi_3\Big)+\\
&\quad +f''(z)\Big(\alpha_0\varphi_0+\beta_0\psi_0+\alpha_2\alpha_0\bar{\xi}_1\int\varphi_2 d\xi_1+\alpha_2'\beta_0\bar{\xi}_2\int\psi_2 d\xi_2+\\
&\quad +\alpha_3\int d\xi_1\int\varphi_2 d\xi_1+\alpha_3'\int d\xi_2\int\psi_2 d\xi_2+\beta_2\int\lambda_1 d\xi_3\Big)\Big],\\
w &= 2\,\mathrm{Re}\Big[f(z)\lambda_2+f'(z)\Big(\lambda_1+\alpha_1\int\varphi_2 d\xi_1+\alpha_1'\int\psi_2 d\xi_2\Big)+\\
&\quad +f''(z)\Big(\lambda_0+\alpha_1\int\varphi_1 d\xi_1+\alpha_1'\int\psi_1 d\xi_2+\beta_3\bar{\xi}_3\int\lambda_3 d\xi_3\Big)\Big].
\end{aligned}
\qquad (2)
$$

where Re[ ] means the real part of the bracket, f(z) is a polynomial of second degree, $\varphi_s = \varphi_s(\xi_1)$, $\psi_s = \psi_s(\xi_2)$, $\lambda_s = \lambda_s(\xi_3)$ $(s=0,1,2)$ are

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The Determination of Tensions in a Space of an Orthotropic Medium With a Cylindric Cavity

analytic functions of the $\zeta_1, \zeta_2, \zeta_3$ ($\zeta_j = x+\mu_j y$, $j=1,2,3$) and α_i, α'_k, β_e are constants. By substituting (2) in the conditions of equilibrium the authors obtain three expressions of the type

$$\mathrm{Re}\left[f(z)\cdot C_{1i}+f'(z)C_{2i}+f''(z)C_{3i}\right] = 0, \quad i=1,2,3.$$

Now the unknown constants are obtained from the claims $C_{ji} = 0$ $(j,i=1,2,3)$. The functions φ_s, ψ_s, λ_s, are then found from the boundary conditions, if the shifts on the cylindrical surface are given in the form

$$\begin{aligned} u &= 2\ \mathrm{Re}\ f(z)p_2+f'(z)p_1+f''(z)p_0\ , \\ v &= 2\ \mathrm{Re}\ f(z)q_2+f'(z)q_1+f''(z)q_0\ , \qquad (13) \\ w &= 2\ \mathrm{Re}\ f(z)t_2+f'(z)t_1+f''(z)t_0\ , \end{aligned}$$

where p_j, q_j, t_j are given functions of the arc of L.

The performance of this method is discussed with the example of a cavity

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C111/C222

The Determination of Tensions in a Space of an Orthotropic Medium With a Cylindric Cavity

for which L is an ellipse, where the boundary conditions are chosen as if at two mutually symmetrical equal pieces of arcs of the ellipse two dies were impressed in it, while the remaining arc of the ellipse is tightly clamped.
There are 2 figures, 1 table and 4 Soviet references.

[Abstracter's note: (Ref.1) concerns S.G.Lekhnitskiy, Theory of Elasticity of the Anisotropic Body, 1950]

ASSOCIATION: Khar'kovskiy avtomobil'no-dorozhnyy institut (Khar'kov Highway Construction Institute)

SUBMITTED: April 28, 1958

Card 4/4

MAKHOVIKOV, V. I.

" Several thermo-elasticity problems for a space having an infinite number of cylindrical apertures."

Report presented at the 1st All-Union Conference on Heat- and Mass-Exchange, Minsk, BSSR, 5-9 June 1961.

25157

S/021/61/000/004/009/013
D213/D303

24 4200

AUTHORS: Rakivnenko, V.M., and Makhovykov, V.I.

TITLE: Concentration around a circular hole in a square plate

PERIODICAL: Akademiya nauk Ukrayins'koyi RSR, Dopovidi, no. 4, 1961, 464 - 468

TEXT: This paper gives an analytical solution for the stress distribution of the load on the square and the hole. The following transformation function was obtained

$$\xi = \omega(\zeta) = \zeta\left[1 + \sum_{k=1}^{4} a_k \zeta^{4k} - \zeta^4\left(\frac{0,00815}{1 + 0,948\zeta^4} + \frac{0,0346}{1 + 0,550\zeta^4}\right)\right]. \quad (1)$$

Here $a_1 = -0.057$, $a_2 = -0.0143$, $a_3 = -0.0051$, $a_4 = 0.0016$. Function (1) describes a square for $\zeta = \varepsilon = e^{i\theta}$, $/0 \leqslant \theta < 2\pi/$, and it describes very nearly a circle $\lambda\varepsilon$ for $\zeta = \lambda\varepsilon$, i.e. $\omega(\lambda\varepsilon) = \lambda\varepsilon(1+\Pi)$

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D213/D303

Concentration around a ...

The error Π is small, and for $\lambda = 1/\sqrt{3}$ it is less than 0.01165, and decreasing markedly with decreasing λi. The problem to be solved was represented by the plane boundary equations

$$\psi(\varepsilon) + \frac{\overline{\omega(\varepsilon)}}{\overline{\omega'(\varepsilon)}}\varphi'(\varepsilon) + \chi_0\overline{\varphi(\varepsilon)} = \Phi_0(\theta), \quad \psi(\lambda\varepsilon) + \frac{\overline{\omega(\lambda\varepsilon)}}{\overline{\omega'(\lambda\varepsilon)}}\varphi'(\lambda\varepsilon) + \chi_1\overline{\varphi(\lambda\varepsilon)} = \Phi_1(\theta). \qquad (2)$$

Here $\varphi(\xi)$, $\psi(\xi)$ are required analytical functions in the annulus $\lambda < |\xi| < 1$; χ_0, χ_1 are given constants; $\Phi_0(\theta)$, $\Phi_1(\theta)$ are given functions which can be expanded

$$\Phi_0(\theta) = \bar{\varepsilon}\sum_{k=0}^{\infty}(b_k^0\varepsilon^{4k} + b_{-k}^0\varepsilon^{-4k}), \quad \Phi_1(\theta) = \bar{\varepsilon}\sum_{k=0}^{\infty}(b_k^1\varepsilon^{4k} + b_{-k}^1\varepsilon^{-4k}). \qquad (3)$$

b_k^0, b_{-k}^0, b_k^1, b_{-k}^1, being constants. Eq. (2) was solved by the method of V.I. Makhovikov (Ref. 2: Pribilizhennyye konformnye otobrazheniya i ikh prilozheniya v teorii uprugosti (Approximate Confor-

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S/021/61/000/004/009/013
D213/D303

Concentration around a ...

mal. Representations and their Application to the Strain Theory) Diss., K., 1959) for the case:

$$\Phi_0(\theta) = p_0\overline{\omega(\varepsilon)},\quad \Phi_1(\theta) = p_1\overline{\omega(\lambda\varepsilon)},\quad \chi_0 = \chi_1 = 1$$

to give

$$\varphi_0(\zeta) = c_0\zeta + \zeta\left[\sum_{k=1}^{2n} A_k\zeta^{4k} + \zeta^4\left(\frac{A_0}{1+0{,}948\zeta^4} + \frac{A_0'}{1+0{,}550\zeta^4}\right)\right] + \frac{p_0\omega(\zeta)}{1+\chi_0} =$$

$$= \sum_{k=0}^{\infty} C_k\zeta^{4k+1} + \frac{p_0\omega(\zeta)}{1+\chi_0},\quad \varphi_1(\zeta) = \lambda\sum_{k=1}^{n} C_{-k}\left(\frac{\lambda}{\zeta}\right)^{4k-1};$$

(11)

(11)

$$\psi_0(\zeta) = \frac{1}{\zeta}\left\{\sum_{k=0}^{2n}\left(B_k\zeta^{4k} + B_n'\zeta^{-4k}\sum_{j=2n+1}^{\infty} b_j\zeta^{4j} + c_1(\zeta^4+0{,}948)^{-1} + c_2(\zeta^4+0{,}550)^{-1} +\right.\right.$$

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$$
+\frac{1}{\omega'(\zeta)}\left[c_3(\zeta^4+0{,}948)^{-1}+c_4(\zeta^4+0{,}550)^{-1}+\left(\frac{c_5}{\zeta^4+0{,}948}+\right.\right.
$$

$$
\left.\left.+\frac{c_6}{\zeta^4+0{,}550}\right)\varphi_0'(\zeta)+\left(1+\sum_{k=1}^{4}a_k\zeta^{-4k}\right)\sum_{k=n+5}(4k+)C_k\zeta^{4k}\right]\Bigg\}= \qquad (11)
$$

$$
=\sum_{k=0}^{\infty}C'_k\zeta^{4k-1},\quad \psi_1(\zeta)=\sum_{k=1}^{n}C'_{-k}\left(\frac{\lambda}{\zeta}\right)^{4k+1},
$$

where A_k, A_o, A_o^1, B_k^1, c_1, c_2, ..., c_6 are certain constants and b_k are the coefficients of expansion

$$
\frac{1}{\omega'(\zeta)}=1+\sum_{k=1}^{\infty}b_k\zeta^{4k}
$$

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Concentration around a ...

S/021/61/000/004/009/013
D213/D303

For real p_0 and p_1 constant pressure results of magnitude p_0 and p_1 on the square and the circular opening, respectively. Function (11) satisfies accurately the boundary equation for the square and very nearly for the circular opening. Table 1 gives the first few coefficients of the expansion of function (11) for the case n = 4,

$$\lambda = \frac{1}{\sqrt{3}}, \ \lambda = 0.625a, \ \chi_0 = \chi_1 = 1,$$

and p is $p_0 - p_1$. The stresses on the opening were calculated from the formula

$$\sigma_\theta = -\sigma_p + 4\mathrm{Re}[\varphi'(\lambda\varepsilon)/\omega'(\lambda\varepsilon)]$$

where $\sigma_p = p_1$. Table 2 gives the values of σ for certain positions on the opening (for = $1/\sqrt{3}$). As the boundary equation for the square is satisfied exactly, the remainder error is zero, while for the opening the error is less than 0.025 p, which gives a sa-

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Concentration around a ...

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tisfactory solution to the problem. There are 2 tables, 1 figure, and 3 Soviet-bloc references.

ASSOCIATION: Ukrayins'kyy zaochnyy politekhnichnyy instytut (Ukrainian Polytechnic Institute)

PRESENTED: H.M. Savin, Member AS UkrSSR

SUBMITTED: June 17, 1960

Card 6/7

S/170/61/004/001/013/020
B019/B056

11.9000

AUTHOR: Makhovikov, V. I.

TITLE: Problems of Heat Conduction and Thermo-elasticity of a Plane With an Infinite Number of Groups of Openings

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1961, Vol. 4, No. 1, pp. 82-91

TEXT: A steady, two-dimensional heat problem is analytically investigated, where the plane (space) investigated is assumed to contain an infinite number of similar groups of circular openings, each of these groups having the same temperature field. In the course of a complex investigation, the first part deals with the problem of heat conduction. The boundary problem is solved with the aid of special functions, which reduce the problem to a plane, single-connected problem for the i-th opening. Corresponding to the steady conditions, the temperature T is a harmonic function, and is composed of an analytical part and a complex part which is conjugate hereto. This function is obtained by means of the boundary problem outlined above. The boundary problem of the thermoelastic problem is solved by VB

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Problems of Heat Conduction and Thermo- elasticity of a Plane With an Infinite Number of Groups of Openings

S/170/61/004/001/013/020
B019/B056

reduction of the boundary conditions by analytical functions. There are 1 figure and 4 Soviet references.

√B

ASSOCIATION: Avtomobil'nodorozhnyy institut, g. Khar'kov (Institute of Motor Roads, Khar'kov)

SUBMITTED: July 12, 1960

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22829

S/170/61/004/005/015/015
B111/B214

11.9100

AUTHOR: Makhovikov, V. I.

TITLE: The problem of heat conduction in a cylinder

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 5, 1961, 118-124

TEXT: Two solutions of the heat conduction equation (without initial values) are given. The cylinder is considered to lie parallel to the z-axis and have an arbitrary cross section. For the solution of the heat equation:

$$N(T) = 4\frac{\partial^2 T}{\partial \xi \partial \bar{\xi}} + \frac{\partial^2 T}{\partial z^2} - \frac{1}{a}\frac{\partial T}{\partial t} = 0 \qquad (1)$$

(T - the desired temperature inside the cylinder; t - time; $\xi = x + iy$; $\bar{\xi} = x - iy$) the auxiliary function $T_1 = e^{ixz+ia\varkappa t} \cdot \sum_{K=0}^{n} f^{(n-k)}(z)\Phi_K(\xi)$ ($\varkappa$ .. - material constant; $f^{(s)}(z)$ - s-th derivative of f with respect to z) is first inserted in Eq.(1), and

X

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The problem ...

$$+f''(z)\left[4\frac{\partial^2\Phi_{n-1}}{\partial\xi\,\partial\bar\xi}+2\sqrt{i\varkappa}\,\Phi_n\right]+4f(z)\frac{\partial^2\Phi_n}{\partial\xi\,\partial\bar\xi}+f^{(n+2)}(z)\,\Phi_0+ \tag{3}$$

$$+f^{(n+1)}(z)\left[\Phi_1+2\sqrt{i\varkappa}\,\Phi_0\right]\Big\}=0.$$

obtained. This equation is certainly satisfied when f is a polynomial of the nth degree and

$$\left.\begin{aligned}&\Phi_n=\varphi_n=\Phi_n(\xi),\ \Phi_{n-1}=\varphi_{n-1}-\frac{\sqrt{i\varkappa}}{2}\bar\xi\int\varphi_n\,d\xi=\Phi_{n-1}(\xi),\\&\Phi_k=\Phi_k(\xi)=\varphi_k-\frac{1}{4}\int d\bar\xi\int\left[\Phi_{k+2}(\xi)+2\sqrt{i\varkappa}\,\Phi_{k+1}(\xi)\right]d\xi,\\&\qquad k=n-2,\ n-3,\dots,0.\end{aligned}\right\} \tag{4}$$

holds. It is seen that the solution of (1) can be written as:

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The problem ...

$$T = \mathrm{Re}\left\{ e^{\sqrt{i\varkappa}z + i\varkappa at} \sum_{k=0}^{n} f^{(n-k)}(z) \left[\Phi_k(\xi) + \Psi_k(\bar{\xi})\right] \right\}. \quad (5)$$

Where

$$\left.\begin{aligned} &\Psi_n(\bar{\xi}) = \bar{\varphi}_n,\ \Psi_{n-1}(\bar{\xi}) = \bar{\varphi}_{n-1} - \frac{\sqrt{i\varkappa}}{2}\,\xi \int \bar{\varphi}_n d\bar{\xi}, \\ &\Psi_k(\bar{\xi}) = \bar{\varphi}_k - \frac{1}{4}\int d\xi \int \left[\Psi_{k+2}(\bar{\xi}) + 2\sqrt{i\varkappa}\,\Psi_{k+1}(\bar{\xi})\right] d\bar{\xi}, \\ &k = n-2,\ n-3,\ \ldots,\ 0. \end{aligned}\right\} \quad (6)$$

At the surface of the cylinder, the temperature is given in the form:

$$T = \mathrm{Re}\left[e^{\sqrt{i\varkappa}z + i\varkappa at} \sum_{k=0}^{n} f^{(n-k)}(z) p_k \right], \quad (7)$$

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The problem ...

(p_k - function of the arc of the contour K limiting the cross section of the cylinder). The boundary condition (5) is satisfied by (7) and so it is sufficient to obtain a solution along the contour: $\Phi_k(\xi) + \Psi(\bar{\xi}) = p_k$, $k = n, n-1 \ldots 0$. From this the functions φ_n, Ψ_n, φ_{n-1}, Ψ_{n-1}, etc. may be successively determined according to the method of solution of a surface harmonic problem. The boundary conditions on the plane surfaces of the cylinder remain unsatisfied. For a unique solution it is necessary to add to the function (5) the solution of vanishing boundary condition at the cylindrical surface and given boundary values at the plane surfaces of the cylinder. Initial values were neglected. This is valid for times far removed from the time of switching on. Second solution: If the expression

$$T = e^{\alpha z}\cdot\cos\left(\frac{\varkappa z}{2\alpha} + \varkappa a t\right)\mathrm{Re}\,\Phi \text{ is substituted in (1),}$$

$$U(\Phi) = \frac{\partial^2\Phi}{\partial\xi\partial\bar{\xi}} - \mu\Phi = 0, \qquad \mu = \frac{1}{4}\left(\alpha^2 - \frac{\varkappa^2}{4\alpha^2}\right). \qquad (10)$$

and

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The problem ...

$$\Phi = \varphi(\xi) + \sum_{k=1}^{n} \frac{\mu^k}{k!} \bar{\xi}^k \int_k \varphi(\xi)\, d\xi. \qquad (11)$$

are obtained where $\varphi(\xi)$ is an analytic function;

$$\delta = -\frac{\mu^{n+1}}{n!} \bar{\xi}^n \int_n \varphi(\xi)\, d\xi. \qquad (12)$$

.....

holds. It is shown that δ can be neglected for sufficiently large n. If the temperature is given in the form

$T = e^{\alpha z} \cos\left(\frac{\varkappa z}{2\alpha} + \varkappa a t\right) f(x,y)$ at a cylindrical surface, the following equation holds at the cross sectional boundary of the cylinder: $\mathrm{Re}\,\Phi = f(x,y)$. A hollow cylinder is considered as an example. The cylinder is bounded by an external circular area K_o and internal circular area K_s (s = 1, 2, .. m). The equations for the circles are:

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The problem ...

$$\xi_0 = \varepsilon = e^{i\theta},\ 0 \leqslant \theta < 2\pi,\ \xi_s = \lambda_s \varepsilon + H_s, \tag{14}$$

If the function Φ is written in the form

$$\Phi = \sum_{\nu=0}^{m} \Phi_\nu(\xi, \bar{\xi}),\ \Phi_\nu(\xi, \bar{\xi}) = \sum_{k=0}^{n} \frac{\mu^k}{k!} \bar{t}_\nu^k \int_k \varphi_\nu(t_\nu)\, d\xi, \tag{16}$$

it satisfies Eq. (11) exactly to within expression

$$\delta = -\frac{\mu^{n+1}}{n!} \sum_{\nu=0}^{n} \bar{t}_\nu^n \int_n \varphi_\nu(t_\nu)\, d\xi. \tag{18}$$

After a longer calculation one obtains for $\Phi_s(\xi, \bar{\xi})$

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The problem ...

$$\Phi_s(\xi,\bar{\xi}) = \sum_{k=0}^{n_s} c_k^s(t_s)\,\varphi_k^s\left(\frac{\lambda_s}{t_s}\right)^k + \delta_s(\xi). \qquad (21)$$

~~Здесь при~~ For $k > 1$ and

$$c_k^s(t) = \sum_{p=0}^{k-1} \frac{(k-p-1)!}{p!\,(k-1)!}\,(-\mu t\bar{t})^p +$$

$$+\frac{(-\mu t^2)^k}{(k-1)!}\left[\sum_{p=1}^{n} \frac{a_k^p(\mu t\bar{t})^p}{p!\,(k+p)!} + \sum_{p=1}^{n-k} \frac{b_p(\mu t\bar{t})^p}{p!\,(k+p)!}\right] -$$

$$-\frac{(-\mu)^k}{k!\,(k-1)!}\left[1 + k!\sum_{p=1}^{n-k} \frac{(\mu t\bar{t})^p}{p!\,(k+p)!}\right](t^{2k} + t^k\bar{t}^k)\ln t, \qquad (22)$$

a

$$c_0^s(t) = \sum_{p=0}^{n} \frac{(\mu t\bar{t})^p}{p!\,p!}\,(\ln t - a_0^p),\ s \neq 0\,.$$

$$a_0^0 = 0;\ a_k^1 = \frac{1}{k+1};\ a_k^p = a_k^{p-1} + \frac{1}{k+p}$$

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The problem ...

It is shown in the following that at the boundary curves K_s ($s = 1, 2, .. m$) the function $f(x,y)$ can be written in the form

$$f(x,y) = \operatorname{Re} \sum_{K=0}^{n_s} p_k^s \varepsilon^k,$$ the p_k^s being real constants. There are

2 Soviet-bloc references.

SUBMITTED: January 16, 1961

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AUTHOR: Makhovikov, V. I.

TITLE: Solution of problems of heat conduction and thermoelasticity for a cylinder with multiply connected cross section

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 8, 1961, 99 - 106

TEXT: The method of conformal mapping has been used to study the temperature field and thermoelastic stresses in multiply connected cylinders under a steady-state behavior, with temperature remaining constant along the cylinder elements. The cylinder cross section is a multiply connected region D', bounded by m + 1 contours K'_ν ($\nu = 0,1,\dots,m$). In addition, the conformal mapping $\xi = x + iy = \omega(\zeta)$ of region D' on- to the region D bounded by m + 1 circles K'_ν is assumed to be known. K_ν are defined by the equations $\zeta_0 = \varepsilon = e^{i\theta}$, $\zeta_j = \lambda_j \varepsilon + H_j$, $-\pi\theta \leq \pi$ (1), where λ_j are real and H_j complex constants. Moreover,

$$\left.\begin{array}{l} \lambda_j + |H_j| < 1,\ H_{jt} = H_j - H_t,\ j = 1, \dots, m,\ t = 1, \dots, m,\ t \neq j, \\ |H_{jt}| > \lambda_j + \lambda_t,\ \ \lambda_t |\lambda_j \varepsilon + H_{jt}|^{-1} < 1,\ \ \lambda_j |\varepsilon - H_j|^{-1} < 1. \end{array}\right\} \quad (2)$$

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Solution of...

and $T = F(\xi) + \overline{F(\xi)}$, where $F(\xi)$ is a function being analytic in D', and $\overline{F(\xi)}$ is a function that is conjugate complex to it. Since $\xi = \omega(\zeta)$, also $F(\xi) = F[\omega(\zeta)] = \Phi(\zeta)$ is valid, where $\Phi(\zeta)$ denotes a function being analytic in D. Problem of heat conduction: The temperature on the boundary surfaces of the cylinder is assumed to be given as a function of the respective arcs of the contours K'_ν. Then, the boundary conditions in the region D' will pass over into the boundary conditions in the region D because of the conformal mapping $\xi = \omega(\zeta)$:
$\Phi(\zeta_\nu) + \overline{\Phi(\zeta_\nu)} = T_\nu(\theta)$, $\nu = 0,1,\ldots,m$ (3), where $T_\nu(\theta)$ are given functions. Equations (3) are solved by the formulation

$$\Phi(\zeta) = \sum_{\nu=0}^{m} [\Phi_\nu(\zeta - H_\nu) + \gamma_\nu \ln(\zeta - H_\nu)], \quad \gamma_0 = H_0 = 0, \qquad (7),$$

where the functions $\Phi_0(\zeta)$ for $|\zeta| < 1$ and $\Phi_j(\zeta)$ for $|\zeta| > \lambda_i$ are analytic. On the boundary circumferences K_0 and $K_j (j = 1, \ldots, m)$, this function (7) has the properties $\Phi(\varepsilon) = \Phi_0(\varepsilon) + \sum_{k=1}^{n_0} A_k^0 \bar{\varepsilon}^{-k} + \sum_{j=1}^{m} \gamma_j \ln \varepsilon + \delta_0$ (12) and

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$\Phi(\zeta_j) = \Phi_j(\lambda_j \varepsilon) + \gamma_j \ln \varepsilon + \sum_{k=0}^{n_j} A_k^j \varepsilon^k + \delta_j$ (16), respectively, where

$$\left.\begin{aligned} A_k^j &= \sum_{s=1}^{n_j} \left\{ a_{sj}^k \gamma_{s0} + \sum_{t=1}^{m} \left[b_{sjt}^k \gamma_{st} - \left(\frac{-\lambda_j}{H_{jt}} \right)^k \frac{\gamma_t}{k} \right] \right\}, \\ & k = 1, 2, \ldots \\ A_0^j &= \gamma_j \ln \lambda_j + \sum_{t=1}^{m} \left[\gamma_t \ln H_{jt} + \sum_{s=1}^{n_j} \left(\frac{\lambda_j}{H_{jt}} \right)^s \gamma_{st} \right] + \sum_{s=1}^{n_j} \gamma_{s0} H_j^s. \end{aligned}\right| \quad (17)$$

is valid.

$$\delta_j = \delta_0^j + \delta_1^j, \quad \delta_1^j = \sum_{k=n_j+1}^{\infty} \sum_{t=1}^{m} \left[b_{sjt}^k \gamma_{st} - \left(\frac{-\lambda_j}{H_{jt}} \right)^k \frac{\gamma_t}{k} \right] \varepsilon^k.$$

By substituting (12) and (16) in (3) one obtains an equation of the Dirichlet type:

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$$2\,\mathrm{Re}\left[\Phi_0(z) + \sum_{k=1}^{n_0} A_k^{*} z^{-k} - f_0(z) + \delta_0\right] = 0, \quad 2\,\mathrm{Re}\left[\Phi_j(\lambda_j z) + \sum_{k=0}^{n_j} A_k^{j} z^{k} - f_j(\lambda_j z) + \delta_j\right] = 0. \qquad (18)$$

with the approximate solution

$$\Phi_0(\zeta) = f_0(\zeta) - \sum_{k=1}^{n_0} \bar{A}_k^{*} \zeta^{k}, \quad \Phi_j(\zeta) = f_j(\zeta) - \sum_{k=1}^{n_j} \bar{A}_k^{j} \left(\frac{\lambda_j}{\zeta}\right)^{k} - a_0^{j}, \qquad (19).$$

The latter formula is accurate to within δ_ν on the circumference K_ν. For sufficiently large n , $|\delta_\nu| < \delta$ is valid. Problem of thermoelasticity: The shifts u and v of space, which are parallel to the axes x and y, respectively, must satisfy the thermoelastic equation by Duhamel and Neumann: $\frac{1}{1-2\mu}\frac{\partial\theta}{\partial\bar{\zeta}} + 2\frac{\partial^2}{\partial\zeta\partial\bar{\zeta}}(u - iv) = \beta\frac{\partial T}{\partial\bar{\zeta}}$ (22). The stresses are given by $\sigma_x + \sigma_y = 2G\left(\frac{\theta}{1-2\mu} - \beta T\right)$, $\sigma_x - \sigma_y - 2i\tau_{xy} = 4G\frac{\partial}{\partial\zeta}(u - iv)$ (23) with

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$\theta = 2\mathrm{Re}\frac{\partial}{\partial \xi}(u - iv)$, $\beta = 2\alpha\frac{1+\mu}{1-2\mu}$. α is the coefficient of thermal expansion, μ is Poisson's ratio, and G is the shear modulus. Since $T = F(\xi) + \overline{F(\xi)}$, equation (22) is also satisfied by the shifts

$$u - iv = \psi_*(\xi) + \overline{\xi}\varphi_*'(\xi) + \varkappa\overline{\varphi_*(\xi)} + f_0(\xi, \overline{\xi}). \qquad (24)$$

with
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$$f_0(\xi, \overline{\xi}) = q\{\varkappa\overline{\xi}T + \xi(\overline{\xi} - \xi)F'(\xi) + (\varkappa - 1)[\xi\overline{\xi}F'(\xi) + \varkappa\int\overline{\xi}\,\overline{F'(\xi)}\,d\overline{\xi}]\}; (25).$$

Here, $\psi_*(\xi)$, $\varphi_*(\xi)$ are functions being analytic in the region D', and $\varkappa = 4\mu - 3$; $q = \frac{\alpha}{2\varkappa}\frac{1+\mu}{1-\mu}$. The combination of the edge stresses p_n, t_n can be represented in the form

$$-2G[\psi_*(\xi) + \overline{\xi}\varphi_*'(\xi) + \overline{\varphi_*(\xi)} + f_1(\xi, \overline{\xi})] = \int(p_n - it_n)\,d\overline{\xi} + c, \qquad (26)$$

and $$f_1(\xi, \overline{\xi}) = \varkappa q[\overline{\xi}T + \xi(\overline{\xi} - \xi)F'(\xi)]; \qquad (27).$$

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Here, p_n and t_n denote the components of external stresses being, respectively, perpendicular and tangential to the edge. The formulas for the stresses assume, after (24) is introduced, the form

$$\left.\begin{aligned}\sigma_x + \sigma_y &= -8G\,\mathrm{Re}\,\{\varphi_*'(\xi) + \varkappa q\,[\xi F'(\xi) + F(\xi)]\},\\ \sigma_x - \sigma_y - 2i\tau_{xy} &= 4G\,\{\psi_*'(\xi) + (\bar{\xi} - \xi)\varphi_*''(\xi) - \varphi_*'(\xi) + \varkappa q(\bar{\xi} - \xi)[2F'(\xi) + \\ &\quad + \xi F''(\xi)]\}.\end{aligned}\right\} \quad (28).$$

Applying the conformal mapping $\xi = \omega(\zeta)$ of the region D' to the region D, the following boundary conditions of the problem are obtained from (24) or (26) (expressed in shifts or stresses):

$$\psi(\zeta_\nu) + \mu_\nu(\theta)\varphi'(\zeta_\nu) + \varkappa_\nu \overline{\varphi(\zeta_\nu)} = f_\nu(\theta) + c_\nu, \quad \nu = 0, 1, \ldots, m. \quad (29).$$

Here, $\mu_\nu(\Theta) = \omega(\zeta_\nu)/\omega'(\zeta_\nu)$, and $f_\nu(\Theta)$ are functions given on K_ν', being piecewise continuous and periodic with respect to Θ; c_ν are arbitrary constants and $\varkappa_\nu$ are given constants. From these equations (29) and with the function

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$$\varphi(\zeta) = \sum_{\nu=0}^{m} [\varphi_\nu(\zeta - H_\nu) + \alpha_\nu \ln(\zeta - H_\nu)], \quad \psi(\zeta) = \sum_{\nu=0}^{m} [\psi_\nu(\zeta - H_\nu) + \varkappa_\nu \bar{\alpha}_\nu \ln(\zeta - H_\nu)], \tag{30}$$

and the series expansion

$$\varphi_0(\zeta) = \sum_{k=1}^{\infty} \alpha_k^0 \zeta^k, \quad \psi_0(\zeta) = \sum_{k=0}^{\infty} \beta_k^0 \zeta^k, \quad |\zeta| < 1, \tag{31}$$

$$\varphi_j(\zeta) = \sum_{k=1}^{\infty} \alpha_k^j \left(\frac{\lambda_j}{\zeta}\right)^k, \quad \psi_j(\zeta) = \sum_{k=1}^{\infty} \beta_k^j \left(\frac{\lambda_j}{\zeta}\right)^k, \quad |\zeta| > \lambda_j, \tag{31'}$$

one obtains the equations

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$$\left.\begin{aligned}\psi_0(\varepsilon) + \mu_0(\theta)\,\varphi_0'(\varepsilon) + \varkappa_0\,\overline{\varphi_0(\varepsilon)} &= N_0(\theta) - \Pi_0,\\ \psi_j(\lambda_j\varepsilon) + \mu_j(\theta)\,\varphi_j'(\lambda_j\varepsilon) + \varkappa_j\,\overline{\varphi_j(\lambda_j\varepsilon)} &= N_j(\theta) - \Pi_j,\quad j = 1,\ \ldots,\ m.\end{aligned}\right\} \quad (34)$$

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with

$$\left.\begin{aligned}N_0(\theta) &= f_0(\theta) - \sum_{k=1}^{n_0}\left[B_k^0\,\bar{\varepsilon}^k - \mu_0(\theta)\,k\bar{B}_k^0\,\bar{\varepsilon}^{k+1} + \varkappa_0\bar{B}_k^0\,\varepsilon^k\right] -\\ &\quad - \mu_0(\theta)\,\bar{\varepsilon}\sum_{j=1}^{m}\varkappa_j\bar{\alpha}_j + c_0,\\ N_j(\theta) &= f_j(\theta) - \sum_{k=0}^{n_j}\left[B_k^j\,\varepsilon^k + \mu_j(\theta)\,\frac{k}{\lambda_j}\,B_k^j\,\varepsilon^{k-1} + \varkappa_j\,\bar{B}_k^j\,\bar{\varepsilon}^k\right] -\\ &\quad - \varkappa_j\alpha_j\,\frac{\bar{\varepsilon}}{\lambda_j}\,\mu_j(\theta) + c_j,\end{aligned}\right\} \quad (35)$$

$$\Pi_\nu = \delta_\nu^* + \mu_\nu(\theta)\,\frac{d\delta_\nu}{d\lambda_\nu\varepsilon} + \varkappa_\nu\,\bar{\delta}_\nu,\quad \nu = 0,\ 1,\ \ldots,\ m. \quad (36)$$

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If $\nu = 0$, equations (34) are solved with respect to the functions $\varphi\nu(\zeta)$ and $\psi\nu(\zeta)$ for each j separately. This is done by the well-known method used to solve a singly connected problem. In this connection, it is easy to obtain $\varphi_0(0) = 0$, $\varphi_j(\infty) = 0$. In the thermoelastic problem for a space with three circular, cylindrical openings, $\xi = \omega(\zeta) = \zeta$, and the temperature is given by $T = \Phi(\zeta) + \overline{\Phi(\zeta)}$, where (21) holds for $\Phi(\zeta)$. The edge stresses at the openings K_1, K_2, K_3 are equal to zero. Then, the desired functions being analytic outside the three openings read

$$\varphi(\zeta) = -\varkappa q[\varphi_1(\zeta) + \varphi_2(\zeta - h) - \varphi_2(-\zeta - h)],$$

$$\psi(\zeta) = -\varkappa q[\psi_1(\zeta) + \psi_2(\zeta - h) - \psi_2(-\zeta - h)],$$

The errors of Π_1, Π_2 are estimated from the inequalities $|\Pi_1| < 10^{-5}(1 + |t_1| + |t_2|)\, q$, $|\Pi_2| < (1 + |t_1| + |t_2|)q$, $t_1 = p_1 : p$, $t_2 = p_2 : p$, $2p = p_1 + p_2$. Here, p_1 and p_2 denote the constant temperature

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on the openings K_1, K_2, and K_3. There are 1 table and 3 Soviet-bloc references.

SUBMITTED: December 7, 1960

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AUTHOR: Makhovikov, V. I.

TITLE: Some problems of the theory of elasticity for a cylinder of a transversal-isotropic material

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, no. 5, 1961, 27-38

TEXT: The author considers a cylinder the generating lines are parallel to the z-axis, the directrix L of which includes a region D, and the height of which is sufficiently large compared with D. Let the z-axis be the axis of the elastic symmetry, the cylinder is isotropic in the planes perpendicular to the z-axis. Then the Hook's law reads:

$$\left.\begin{array}{ll} E\varepsilon_x = \sigma_x - \nu\sigma_y - \mu\nu_1\sigma_z, & G\gamma_{xy} = \tau_{xy}, \\ E\varepsilon_y = \sigma_y - \nu\sigma_x - \mu\nu_1\sigma_z, & G'\gamma_{xz} = \tau_{xz}, \\ E\varepsilon_z = -\nu_1(\sigma_x + \sigma_y) + \mu\sigma_z, & G'\gamma_{yz} = \tau_{yz} \end{array}\right\} \quad (1)$$

where $\mu = E : E_1$; E and E_1 are the moduli of elasticity in the

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Some problems of the theory . . .

direction of the isotropic planes and $\perp$ to them, ν -- transverse contraction in the isotropic plane for a stretching in the same plane, ν_1 -- transverse contraction in the isotropic plane for a stretching in the direction of the z-axis; G and G' -- moduli of shearing for planes being parallel or perpendicular to the isotropic plane.

The equilibrium equations in the shifts u,v,w read

$$\left.\begin{aligned}
&g_2 \frac{\partial^2 u}{\partial x^2} + G \frac{\partial^2 u}{\partial y^2} + G' \frac{\partial^2 u}{\partial z^2} + (G + g_4) \frac{\partial^2 v}{\partial x \partial y} + (G' + g_3) \frac{\partial^2 w}{\partial x \partial z} = 0, \\
&G \frac{\partial^2 v}{\partial x^2} + g_2 \frac{\partial^2 v}{\partial y^2} + G' \frac{\partial^2 v}{\partial z^2} + (G + g_4) \frac{\partial^2 u}{\partial x \partial y} + (G' + g_3) \frac{\partial^2 w}{\partial y \partial z} = 0, \\
&G' \frac{\partial^2 w}{\partial x^2} + G' \frac{\partial^2 w}{\partial y^2} + g_1 \frac{\partial^2 w}{\partial z^2} + (G' + g_3) \frac{\partial^2 u}{\partial x \partial z} + (G' + g_3) \frac{\partial^2 v}{\partial y \partial z} = 0.
\end{aligned}\right\} \quad (4)$$

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with

$$g_1 = \frac{E_1}{g_0}(1-\nu), \; g_2 = \frac{E}{g_0}\nu_1, \; g_3 = \frac{\mu(E_1 - \nu_1^2 E)}{g_0(1+\nu)}, \; g_4 = \frac{\mu(\nu E_1 + \nu_1^2 E)}{g_0(1+\nu)}, \tag{3}$$

$$G = \frac{1}{2}(g_3 - g_4) = \frac{E}{2(1+\nu)}, \; g_0 = 1 - \nu - 2\mu\nu_1^2.$$

For the solution of (4) it is put

$$u = \frac{\partial F_0}{\partial y} + \frac{\partial F}{\partial x}, \; v = -\frac{\partial F_0}{\partial x} + \frac{\partial F}{\partial y}, \; w = c\frac{\partial F}{\partial z} \tag{5}$$

the functions F_0, F and the constant c can be determined from (4). It is shown that c may assume two values

$$c_1 = A - \sqrt{A^2 - 1}, \; c_2 = -A + \sqrt{A^2 - 1},$$

$$A = \frac{1}{2}\left[1 + \frac{g_2}{G'} + \frac{G'^2 - g_1 g_2}{G'(G' + g_2)}\right]. \tag{9}$$

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Let correspond to the values c_1 and c_2 the functions $F = F_1$ and $F = F_2$ in (5). Then the shifts (5) satisfying (4) can be written in the form

$$u - iv = 2\frac{\partial}{\partial \xi}(F_1 + F_2 + iF_0), \quad w = \frac{\partial}{\partial z}(c_1F_1 + c_2F_2), \qquad (10)$$

where $\xi = x+iy$, $i = \sqrt{-1}$

$$\frac{\partial^2 F_j}{\partial x^2} + \frac{\partial^2 F_j}{\partial y^2} + \varkappa_j \frac{\partial^2 F_j}{\partial z^2} = 0, \quad j = 0,1,2. \qquad (11)$$

$$\varkappa_0 = \frac{G'}{G}, \quad \varkappa_1 = \frac{1}{g_3}\left[G' + c_1(G'+g_2)\right], \quad \varkappa_2 = \frac{1}{g_3}\left[G'+c_2(G'+g_2)\right] \qquad (12)$$

For the function F satisfying

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